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IS 1885-11 (1966): Electrotechnical vocabulary, Part 11: Electrical measurements [ETD 1: Basic Electrotechnical Standards]



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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

ELECTROTECHNICAL VOCABULARY

PART XI ELECTRICAL MEASUREMENTS

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NEW DELHI 110002

Indian Standard

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Indian Standard

ELECTROTECHNICAL VOCABULARY

PART XI ELECTRICAL MEASUREMENTS

0. FOREWORD

0.1 This Indian Standard (Part XI) was adopted by the Indian Standards Institution on 19 December 1966, after the draft finalized by the Electrotechnical Standards Sectional Committee in consultation with the Electrical Instruments and Meters Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 It has not been found possible to prepare the electrotechnical vocabulary as a complete volume which is, therefore, being issued in several parts, each having one or more sections. A list of other parts in this series is given on fourth cover page.

0.3 This standard follows, to a very large extent, the definitions contained in IEC Doc : 1(20) (Secretariat) 1001 International electrotechnical vocabulary: Group 20 Electrical measurements, Ed 3 issued by International Electrotechnical Commission. This IEC document is the first revised draft of IEC Pub 50(20) (1958) International electrotechnical vocabulary: Group 20 Scientific and industrial measuring instruments, Ed 2.

0.4 The definitions contained in this standard (Part XI) have been drawn with the object of striking a correct balance between absolute precision and simplicity. The principal object of the standard (Part XI) is to provide definitions which are sufficiently clear so that each term is understood with the same meaning by all the users and it does not, therefore, constitute a treatise on electrical measurement terminology. Thus, it may sometimes be felt that the definitions are not sufficiently precise, do not include all cases, do not take account of certain exceptions or are not identical with those which may be found in other publications designed with other objects and for other types of readers. Such imperfections, which will be eliminated as far as possible in later editions, are inevitable and should be accepted in the interest of simplicity and clarity.

1. SCOPE

1.1 This standard (Part XI) covers definitions of terms applicable to electrical measurements. These terms are broadly classified as follows:

- a) Basic principles in measuring techniques;
- b) General terms;

- c) Electrical (electromechanical) measuring instruments;
- d) Electrical compensators, measuring bridges and measuring devices;
- e) Electrically measuring instruments;
- f) Accessories; and
- g) Constructional elements.

1.2 The terms relating to electronics and nuclear instrumentation are not covered in this standard (Part XI).

2. BASIC PRINCIPLES IN MEASURING TECHNIQUES

2.1 Measuring — The activity by which the value of a physical quantity is determined by direct or indirect comparison.

2.2 Quantity to be Measured — The physical quantity the value of which is to be determined, for example, voltage, current, temperature, etc.

2.3 Object to be Measured — If the quantity to be measured is linked to an object it is called object to be measured, for example, lamp, battery, etc.

2.4 Measuring Unit — Quantity chosen as unit for the measure.

2.5 Value — The number showing how many times the chosen measuring unit is contained in the quantity to be measured.

2.6 Measuring Method — The principles according to which measuring is done.

2.7 Measuring Procedure — A collective term covering the apparatus employed, the activity of the operator and the measuring method.

2.8 Standards — Deposited or adequately protected models (samples) which lastingly incorporate or reliably reproduce one or more values or properties of one or more quantities.

2.9 International Standards — Standards which determine with international validity the units of individual physical quantities and which are kept by the International Bureau of Weights and Measures.

2.10 Index — Moving or fixed part of a measuring instrument (pointer, light spot, liquid surface, recording pen, stylus or other means) which makes it possible to read on the measuring instrument the value belonging to the quantity to be measured. For example, on a commercial scale the index (pointer) moves before the fixed indices in which the figures of the moving scale appear.

2.11 Scale — On an indicating instrument, the array of marks, together with any associated figuring with relation to which the position of the index is observed.

or

The series of marks and numbers from which is obtained by aid of an index, the value of the measured quantity.

2.12 Scale with Divisions — Series of appropriately numbered marks placed along a straight line or a curve.

NOTE — It is often called 'Scale'.

2.13 Numbered Scale — A series of numbers placed on one or more planal or spatial surfaces from which is directly obtained in figures the value of the measured quantity, leaving the possibility to estimate the last number.

2.14 Digital Scale — A series of numbers placed on one or more planal or spatial surfaces where the numbers to be read suddenly change, leaving no possibility of estimation.

2.15 Scale Marks — The marks which enable the position of the moving element of an instrument to be identified.

2.16 Scale Numbering — Totality of the figures on the scale from which the value of the measured quantity is directly obtained in figures.

2.17 Division (Scale Spacing) — The distance between the centre lines of two adjacent scale marks. If the marks are placed along a curve the length of arc on a given radius is to be taken.

2.18 Scale Interval — The increment of the measured quantity corresponding to the scale spacing.

2.19 Scale Length — The length of the arc (or the segment of a circle) passing through the centre of the shortest markings on the graduated scale and in the case of platform scales passing through the base of these markings.

2.20 Linear Scale — An equally divided scale each division of which represents the same value.

2.21 Non-linear Scales — Scales, such as square law, logarithmic, reciprocal and others in which divisions having the same value are of unequal widths.

2.22 Indicating Range — The full length of the scale in terms of the values of the measured quantity.

2.23 Effective (Measuring) Range — That portion of the scale over which the instrument, under reference conditions, meets the specified class accuracy.

2.24 Lower and Upper Measuring Limits (Minimum and Maximum Scale Value) — Lower and upper limits of the measuring range.

NOTE — Measuring limit, when used alone, means the upper measuring limit.

2.25 Starting Value — Lowest value of the quantity to be measured at which an integrating instrument, for example, anemometer or watt-hour meter starts, irrespective of the error committed at this value.

2.26 Reading — The numerical indication obtained on the scale at the index of the instrument while determining the value of the quantity to be measured with the instrument.

2.27 Scale Constant — Coefficient by which the reading in divisions shall be multiplied to obtain the value of the measured quantity.

2.28 Measured Value — The product of the reading and the scale constant. It, nevertheless, contains the error of measurement.

NOTE — If the scale is numbered in units of the quantity to be measured the reading is identical with the measured value.

2.29 Absolute Sensitivity — The ratio of the change in the reading to the corresponding change in the quantity to be measured. The dimension of sensitivity is always to be given.

2.30 Constant of a Galvanometer — The reciprocal value of sensitivity of the galvanometer.

NOTE — This is sometimes called ' Figure of Merit ' of the galvanometer.

2.31 Relative Sensitivity — The ratio of the change in the deflection to the corresponding relative change in the quantity to be measured.

2.32 Discrimination — Of a measuring instrument at any indicated value of the quantity to be measured means the smallest change in the quantity to be measured producing a perceptible change in the reading.

2.33 Repeatability — That property of a measuring instrument according to which the reading differs only within determined limits from each other while measuring the same quantity several times during a given period and with unchanged reference conditions.

2.34 Constancy — That property of a measuring instrument which gives for the same quantity to be measured, with unchanged reference conditions, for a longer measuring period the same value or a value with small changes around the reading.

2.35 Accuracy — Of a measuring instrument means that under reference conditions the measured value of any given quantity differs from its true value by less than a given error.

2.36 Class of Quality — A class of measuring instruments (or their accessories) determined by prominent values characterizing the quality.

2.37 Accuracy Class — A classification of measuring instruments (or their accessories), the accuracy of which may be designated by the same number, this being the limit of error when the instrument is used under reference conditions.

2.38 Influence Quantity — One of the quantities which affect the indications of an instrument, but which is not the one measured by the instrument.

For example, an influence quantity of a voltmeter is temperature; of a frequency meter is voltage.

2.39 Reference Conditions — These conditions under which the instrument (or the accessory) meets the requirements concerning intrinsic errors. These conditions determine for the influence quantities reference values or reference ranges.

2.40 Variation in Indication of the Measured Value — Variation in indication due to the influence quantities when the measuring instrument is not used under reference conditions.

2.41 Rating (in Terms of a Limiting Quantity) — The limiting values of a quantity, other than that measured, which permit the proper use of an instrument. For example, the current rating of a wattmeter, varmeter, watt-hour meter or phase meter is the stated value of the current which may be safely passed by the instrument.

2.42 Nominal Range of Use — The range of values which each of the influence quantities may assume when the instrument complies with certain conditions.

2.43 True Value — To any physical quantity to be measured belongs, according to a given interpretation, a value. This is the true value of the quantity to be measured.

NOTE — It is not possible to determine the true value by experiment. Even this does not interfere with its existence.

2.44 Exact Value — An approximation of the ' true value ' obtained by a sufficiently extended series of measurements eliminating systematic errors.

2.45 Presumable Value — The mean of a series of measurements.

2.46 Error of the Standard — The value which should be embodied by the standard is called the nominal value. The value of the standard, as determined by measurements, generally differs from the nominal value even if reference conditions are observed. The difference between the two values obtained by deducting the nominal value from the measured value is the error of the standard.

2.47 Error of an Instrument — When measuring the known value of a physical quantity, the measured value given by a measuring instrument will generally differ from the known value even if reference conditions are present. The measured value minus the known value is the error of the instrument.

2.48 Scale Error — The error introduced in the reading due to the scale marks not being placed at the right place.

2.49 Reversing Difference — If the measured value differs when approached from lower value or from higher value, the difference of the two values is the reversing difference.

NOTE — The ' Reversing Difference ' may be interpreted with respect to the mean of a measuring series.

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2.50 Zero Variation — That part of the deflection of a measuring instrument with restoring torque which remains after the cause producing that deflection has disappeared.

2.51 Error of the Reading Device — Error due to faults in the pitch of the measuring spindle, clearances and staggering of indici and wrong displacement of the scales and form of indici.

2.52 Absolute Error (of an Instrument) — The indicated value of a quantity minus its true value expressed algebraically.

2.53 Relative Error — The ratio of the absolute error to the exact value of the quantity that is being measured.

2.54 Errors Caused by the Quantity to be Measured — These errors are due to the quantity to be measured or to the object bearing upon it as its geometric dimensions or other characteristics are not distinct enough. The characteristics change, the material is oxidized or recrystallization takes place, etc.

2.55 Personal Error — Error due to physical or psychological qualities, momentary inattention or fatigue of the observer.

2.56 Visual Error — Error due to differences in the vision of the observer.

2.57 Error of Estimation — The error caused by the capacity of estimation of different persons being different. The same relative position of scale and index is estimated in different ways.

2.58 Parallax Error — Error due to the direction of observation if the index and the scale are in different planes.

2.59 Systematic Error — The sign and magnitude of a part of the errors affecting the measured value remains unaltered. These errors are called systematic errors.

2.60 Correction — It is equal to the value of the systematic error but opposite in sign.

2.61 Correction Factor — A factor by which it is necessary to multiply the indicated value in order to obtain the true value of the quantity to be measured.

2.62 Accidental Error — Errors disordered in their incidence and variable in magnitude, positive and negative values occurring in repeated measurements in no ascertainable sequence.

2.63 Gross Error — A large error due to strong influence of the ambience or a great personal error which would considerably influence the measured value.

2.64 Determination of Systematic Errors — That activity by which, in one or more points of the measuring range, the measured values obtained with a given instrument are compared with the measured values obtained with an instrument of higher precision or with an adequate standard.

2.65 Series of Measurements — If, in order to determine the exact value of the quantity to be measured, it is measured 'n' times or 'n' objects of the same nominal quantity are measured once each, the totality of the values so obtained is called a series of measurements.

2.66 Mean of a Series of Measurements — The arithmetic mean of the members of the series of measurement, that is:

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{\sum_{a=1}^n x_a}{n}$$

2.67 Variance (s^2) — The sum of the squares of the differences between the members of the series and their arithmetic mean divided by ($n-1$), that is:

$$s^2 = \frac{1}{n-1} \sum_{a=1}^n (x_a - \bar{x})^2$$

2.68 Standard Deviation — Square root of the variance.

2.69 Characteristic Standard Deviation of a Measuring Method — If it is possible for the same person to make measurements with the same equipment it is preferable not to calculate the standard deviation individually for every series, but to base this calculation on a larger mass of data. Such a standard deviation suitable to be substituted is the characteristic standard deviation of a method.

2.70 Limits of Error — The values of accidental errors cannot be determined but it is possible to assess between which limits the error will remain with a given probability, a nearly normal distribution being assumed.

2.71 Limit of Error of a Single Value — The characteristic dispersion (s) of a measuring method is determined by making sufficient measurements in a series. If the measuring method is not altered the probability will be of 99.7 percent with $t = 3$, and of 95 percent with $t = 2$, and the true value (v) will differ from the measured value (x) by less than $\pm ts$, that is:

$$v = x \pm ts$$

2.72 Result of a Measurement — The aim of every measurement is to determine the result of the measurement, this being the mean of the series of measurement amended by the correction and completed by the limit of error.

2.73 Result of a Single Measurement — If the necessary correction E , and the limits of error of the measuring method are known the result

belonging to a single measurement will be:

$$X = x - E_s \pm ts$$

2.74 Result of a Series of Measurements — The mean ($\bar{x}$) of the measured values is amended by the sum of systematic errors (E_s) and completed by the limit of error:

$$X = \bar{x} - E_s \pm \frac{ts}{\sqrt{n}}$$

where

n = the number of measurements taken (this number is not identical with that of the measurements executed in order to determine s), and

s = the characteristic dispersion of the measuring method.

2.75 Uncertainty of the Result of a Measurement — The member with $\pm$ sign in the result of a measurement.

2.76 Constant of a Meter — Coefficient giving the relation between energy nominally measured by a meter and the corresponding angular movement of the rotor. It is usually expressed as watt-hours per revolution (Wh/rev) or number of revolutions per kilowatt-hour (rev/kWh).

2.77 Multiplying Power (of a Galvanometer Shunt) — A factor by which it is necessary to multiply the current passing through a galvanometer connected to a shunt in order to obtain the total current passing through the shunt and the galvanometer.

2.78 Mechanical Zero — That point on the scale at which the index stops when the moving element takes up its equilibrium position, the electrical parts of the instrument being de-energized.

2.79 Calibration — Determination of the relation between the reading of an instrument and the true value of the quantity to be measured.

2.80 Deflection — Deviation of a moving element with reference to a specified position. When no position is specified it is with reference to the zero of the scale.

2.81 Maximum Deflection — The maximum value of the instantaneous deflection of a moving element.

2.82 Restoring Torque — The torque which tends to bring the moving element back to the mechanical zero of the instrument.

2.83 Torsion Torque — The torque produced by torsion.

2.84 Deflecting Torque (Driving Torque) — The torque produced by the quantity or quantities to be measured on the moving element.

2.85 Controlling Torque — The resultant of deflecting and restoring torques.

2.86 Torque-Weight Ratio (of a Meter) — The ratio between the driving torque for nominal power and the weight of the moving element.

2.87 Quality Factor (of a Meter) — The ratio between the torque-weight ratio and the angular velocity of the moving element for nominal power.

2.88 Braking Torque (of a Meter) — A torque the value of which depends on the speed of the moving element and which opposes its motion.

2.89 Damping Torque — A torque which tends to prevent oscillations of the moving element.

2.90 Critical Resistance — The resistance of the circuit of a measuring instrument corresponding with critical damping.

2.91 Idiostatic Circuit (Idiostatic Method) — A method of using an electrometer which does not require an external supply source of current.

2.92 Heterostatic Circuit (Heterostatic Method) — A method of using an electrometer which requires an external source giving a constant difference of potential.

2.93 Symmetrical Heterostatic Circuit — An arrangement of the quadrant electrometer in which the auxiliary potential difference is applied between two quadrants or two pairs of quadrants, the potential difference to be measured being applied between the needle and a point at the mean potential of the quadrants.

2.94 Asymmetrical Heterostatic Circuit — An arrangement of the quadrant electrometer in which the auxiliary potential difference is applied between the needle and one quadrant or a pair of quadrants, the potential difference to be measured being applied between the two quadrants or pairs of quadrants.

2.95 Absolute Method of Measurement — A method in which the measurement of an electrical or magnetic quantity is referred to length, mass and time by using theoretical or conventional relationships.

2.96 Nominal Circuit Voltage — The highest circuit voltage on which the instrument will be used and which may determine its insulation tests.

2.97 Dielectric Test Voltage — The voltage at which the dielectric test on an instrument is made.

2.98 Rated Temperature-Rise Current of an Instrument — The current at which the instrument shall satisfy the conditions of temperature-rise.

2.99 Temperature-Rise Voltage of an Auxiliary Resistor (Capacitor) (Reactor) — The voltage at which the resistor (capacitor) (reactor) complies with the temperature-rise conditions.

2.100 Interchangeable — Applied to accessories of two or more measuring instruments when they may be used in place of one another without affecting accuracy.

2.101 Dynamic Characteristics of a Measuring Instrument — Those characteristics which describe the dynamic behaviour of an instrument.

2.102 Ballistic (Damping) Factor of a Measuring Instrument — The ratio between the first deflection and the permanent deflection when current impulses are passed through the instrument under specified conditions.

2.103 Response Time (of a Measuring Instrument) — The time taken by the moving element of an instrument to come to rest when current impulses are passed through the instrument under specified conditions.

2.104 Meter-Adjusting Devices — Devices which allow correct adjustment of a meter under given conditions.

2.105 Full Load Meter Adjustment — A device for regulating the speed of the moving element at nominal voltage, nominal current and, for alternative current, at nominal frequency and a power factor of unity.

2.106 Power-Factor Adjustment for an Alternating Current Meter — A device for regulating the speed of the moving element for nominal values of voltage, current and frequency and for a phase difference between current and voltage.

2.107 Low-Load Adjustment — A device for varying the auxiliary torque intended to improve the shape of the meter error curve for small currents.

2.108 Stroboscopic Checking of a Meter (Stroboscopic Calibrating of a Meter) — A method of calibration based on stroboscopic observation of the moving element (disc).

2.109 Effective Current Range of a Meter (Accurate Current Range of a Meter) — The range of current values between which the meter has the specified accuracy.

2.110 Limits of Effective Current Range — The values of current corresponding to upper and lower limits of the effective range.

2.111 Limits of Power Range for Accuracy of a Meter — The values of power corresponding to the nominal voltage and the limits of effective current range — for alternating current meters, with unity power-factor; for polyphase meters, with voltages and currents in balance.

2.112 Starting Power of a Meter — The lower limit of power which will cause the moving element to make a complete revolution.

2.113 Thermo-electric Effect — An effect that an emf arises due to a difference of temperature between two junctions of dissimilar materials in the same circuit.

2.114 Temperature Coefficient — The change in the magnitude of any property of a substance, such as its resistance, caused by the rise of 1 deg in temperature and expressed as a fraction of the magnitude at some definite temperature adopted as a standard.

2.115 Thermal Overload Capacity (of a Meter) — The ratio between the current continuously applied for maximum permissible temperature-rise and the rated current of a meter.

2.116 Overload Capacity of a Circuit — The ratio between the maximum current (continuously applied) which a circuit may withstand without damage and its normal current.

2.117 Null Method — A method of measurement in which, when adjustments are complete, no current is flowing in a certain measuring instrument (for example, a galvanometer) situated in a suitable part of the circuit.

2.118 Deflection Method — A method of measurement in which the deflection of a measuring instrument is read.

2.119 Opposition Method — A method of measurement in which an emf or a potential difference is connected in opposition to that at the terminals of a variable resistor through which a current is flowing.

2.120 Potentiometer Method — An opposition method in which the numerical value of the variable resistor is a simple multiple of the voltage to be measured.

2.121 Reference Value — A single value of an influence quantity at which, within given tolerances, the instrument or the accessory complies with the requirements concerning intrinsic errors.

2.122 Reference Range — A range of values of an influence quantity within which the instrument or the accessory complies with the requirements concerning intrinsic error.

2.123 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of instrument or meter.

2.124 Routine Tests — Tests carried out on each instrument or meter to check requirements which are likely to vary during production.

2.125 Acceptance Tests — Tests carried out on samples taken from the lot for the purpose of acceptance of the lot.

3. GENERAL TERMS

3.1 Detecting Instrument — Apparatus intended to denote the existence, and sometimes the direction of a phenomenon.

3.2 Measuring Instrument — An instrument giving the value of the quantity to be measured or the reading necessary to calculate it.

3.3 Indicating Instrument — An instrument which indicates, at any time, the instantaneous, effective, average or peak values of the quantity measured.

3.4 Recording Instrument — An instrument which inscribes or records the instantaneous, effective, average or peak values of the quantity to be measured as a function of time or of another quantity.

3.5 Integrating Instrument (Meter) — An instrument which indicates, at any time, the integral of a quantity from a definite time and to the time when the reading is taken.

3.6 Electronic Instrument — An instrument in which measurement is made by means of an electronic device.

3.7 Vacuum Tube Voltmeter — An instrument to measure voltages containing electronic amplifying elements.

3.8 Oscilloscope — An electronic device containing a cathode-ray tube suitable for reproducing the curve representing the variation of a voltage or of a current as a function of time. It may also serve to show the Lissajous curves of two voltage curves.

3.9 Pointer Instrument — An instrument which gives the readings by the movement of pointer over a scale.

3.10 Projected-Scale Instrument — An instrument in which the scale is projected on to a screen provided with a fixed pointer.

3.11 Shadow Column Instrument — An instrument in which the readings are given by a shadow column on an illuminated scale forming part of the instrument.

3.12 Direct-Reading Instrument — An instrument giving, by a direct reading, a value equal or proportional to the quantity to be measured.

3.13 Mirror Instrument — An instrument in which the reading is given by the movement of a beam of light reflected from a mirror affixed to the moving element.

3.14 Light Spot Instrument — An instrument in which the indication is given by the movement of a light spot over a scale forming part of the instrument.

3.15 Instrument for Absolute Measurement — Apparatus of which the constants may be determined by measurements depending on fundamental quantities only.

3.16 Electrically Measuring Instrument — An instrument using electrical means for measuring a non-electrical quantity.

3.17 Differential Measuring Instrument — An instrument which measures the difference of two quantities of the same kind.

3.18 Aperiodic (Over-Damped) Instrument — An instrument the moving element of which reaches its equilibrium position without oscillations about it.

3.19 Damped Periodic (Under-Damped) Instrument — An instrument in which the moving element reaches its equilibrium position after a few oscillations about that position.

3.20 Critically Damped Instrument — An instrument the moving element of which just reaches its equilibrium position without overshoot. This is the limiting case of an aperiodic instrument.

3.21 Astatic Instrument — An instrument the moving element of which is astatic, that is, so constructed that it is unaffected by uniform electro-magnetic fields.

3.22 Shunted Instrument — A combination of a measuring instrument and a separate shunt.

3.23 Instrument with Contacts — An instrument in which the moving element closes or opens contacts when it arrives at certain fixed or adjustable positions.

3.24 Suppressed Zero Instrument — An instrument the mechanical zero of which is beyond the scale limit.

3.25 Instrument with Locking Device — An instrument in which the moving element is locked in its position when a certain event has happened or at the end of a determined period after the current has begun to flow.

3.26 Instrument with Magnetic Screening — An instrument in which measuring system is surrounded by magnetic circuits, greatly reducing the influence of external magnetic fields.

3.27 Instrument with Electromagnetic Screening — An instrument provided with conducting screens which protect it from the influence of external electromagnetic fields.

3.28 Instrument with Electrostatic Screening — An instrument provided with screens which protect it from the influence of external electric fields.

3.29 Standard Instrument — A measuring instrument of high precision used particularly for calibrating other measuring instruments.

3.30 Laboratory Instrument — A measuring instrument whose accuracy, generally, and condition of use are intermediate between those of a standard instrument and those of a precision instrument.

3.31 Precision Instrument — Instrument of intermediate accuracy, generally portable.

3.32 Industrial Instruments — Instruments in general use which shall be of robust construction and easily read from a distance.

3.33 Summation Instrument — An instrument which measures or registers the sum of the values assumed by quantities of the same kind in several circuits.

3.34 Prototype — One of the first instruments of a specified type which shall be used as a model for instruments of the same type to be manufactured later.

3.35 Pivoted Instrument — An instrument the moving element of which is supported by pivot(s) resting in jewel bearing(s).

3.36 Stressed Fibre Instrument — An instrument the moving element of which is supported by a stressed fibre.

3.37 Fibre Suspension Instrument — An instrument the moving element of which is suspended on a fibre.

3.38 Current Circuit — That part of a measuring instrument through which flows the current, one of the currents to be measured or a proportional current supplied by a current transformer or derived from a shunt.

3.39 Voltage Circuit — That part of a measuring instrument supplied by the voltage to be measured or a proportional voltage supplied by a transformer or a voltage reducer.

3.40 Direct Writing-Recording Instrument — A recording instrument in which the marking device is moved by the moving part of the measuring system.

3.41 Indirect Writing (Relay-Type)-Recording Instrument — A recording instrument in which the marking device is moved by a secondary driving force controlled by the measuring instrument.

3.42 Slow Response Recording Instrument — A recording instrument that reaches an indication of 90 percent of the final value in not less than 0.05 second.

3.43 X-Y Recording Instrument — A slow response recorder which may plot a given variable against any other, including time 't', in Cartesian co-ordinates.

3.44 Pen Recording Instrument — A recording instrument in which the tracing on the chart is accomplished by means of a pen fed with suitable ink.

3.45 Stylus Recording Instrument — A recording instrument in which the inscription is effected by a stylus engraving, by locally evaporating a metallic product covering the chart or by any other means.

3.46 Continuous Line Recording Instrument — A recording instrument with pen or stylus in which the inscription is effected on a continuous line.

3.47 Dotted Line Recording Instrument — A recording instrument with pen or stylus in which the inscription is effected in a discontinuous manner by successive point impressions by means of a mechanism independent of the measuring element.

3.48 Roll (Strip) Chart — The chart passed over a suitable mechanism driven by a clock. It is either rewound by an automatic respooling device or is passed out through a slot into or from the recorder case.

3.49 Drum Chart — The chart wrapped round a cylindrical drum which is driven by the clock, the record being completed in one revolution of the drum.

3.50 Disc (Circular) Chart — A disc of paper which is driven by the clock, the record being completed in one revolution of the chart.

3.51 Chart-Mark — The line on the chart indicating the value of the quantity recorded.

3.52 Chart Scale-Length — Direct distance between the extreme scale marks on the chart.

3.53 Spring-Operated Chart-Driving Mechanism — Suitable means for winding, starting, stopping and regulating the clock, operated by a spring.

3.54 Synchronous Motor-Driven Clock — Suitable means for driving the chart-driving mechanism, using a synchronous motor.

3.55 Self-Starting Synchronous Motor-Driven Clock — Suitable means for driving the chart-driving mechanism, using a self-starting synchronous motor.

3.56 Electrically-Wound Spring-Operated Chart-Driving Mechanism — Suitable means for winding, starting, stepping and regulating the clock, operated by an electrically-wound spring.

4. ELECTRICAL (ELECTROMECHANICAL) MEASURING INSTRUMENTS

4.1 Electrical Measuring Instrument — An instrument which measures an electrical quantity.

4.2 Electrostatic Instrument — An instrument the operation of which depends on electrostatic forces.

4.3 Permanent-Magnet Moving-Coil Instrument — An instrument which depends for its operation on the reaction between the magnetic field of a movable coil or coils produced by the current passing through it and the magnetic field of a fixed permanent magnet.

4.4 Moving-Iron Instrument — An instrument comprising a movable piece of iron which is actuated by a fixed coil carrying a current or by a fixed piece of iron magnetized by the current. It is sometimes called 'Ferromagnetic instrument'.

4.5 Permanent-Magnet Moving-Iron Instrument — An instrument comprising a movable piece of iron actuated by a fixed magnet and a fixed coil carrying a current.

4.6 Moving-Magnet Instrument — An instrument in which one or several fixed coils carrying currents actuate a moving magnet or system of magnets.

4.7 Electrodynamic Instrument — An instrument which makes use of the force exerted between fixed and moving coils carrying currents. This term is generally reserved for instruments which do not incorporate ferromagnetic pieces placed across the lines of magnetic flux.

4.8 Ferrodynamic Instrument — An instrument in which electrodynamic effect is increased by the presence of ferromagnetic material.

4.9 Induction Instrument — An instrument which makes use of the effect of fixed inductive circuits on currents which they induce in moving conducting elements.

4.10 Rotating Field Instrument — An induction instrument in which the moving element is subjected to the action of several alternating fields which have phase differences between them so that the resulting magnetic field is a rotating field.

4.11 Thermal (Electrothermic) Instrument — An instrument the operation of which depends upon the heating effect of a current.

4.12 Hot-Wire Instrument — An instrument in which the expansion of a wire, directly or indirectly heated by a current, is transmitted to the moving element.

4.13 Bimetallic Instrument — An instrument in which the deformation of a bimetallic element, directly or indirectly heated by a current, is transmitted to the moving element.

4.14 Bolometric Instrument — An instrument depending for its action upon the variation in resistance of a conductor caused by the current to be measured.

4.15 Thermocouple Instrument — An instrument in which the current to be measured heats a thermocouple, the voltage (electromotive force) from which is generally measured by a permanent-magnet moving-coil instrument.

4.16 Rectifier Instrument — An instrument which is the combination of an instrument sensitive to direct current and a rectifying device whereby alternating currents (voltages) may be measured.

4.17 Vibrating Reed Instrument — An instrument in which metallic strips resonate under the action of a periodic current flowing through fixed coils which are sometimes combined with a magnet.

4.18 Magnetoscope — An instrument depending for its action on magnetic forces and intended to indicate the existence of a magnetic field.

4.19 Earphone — A simple telephone receiver which gives audible indication of the flow of a weak current of audible frequency. It is principally used as balance indicator in null methods.

4.20 Electroscope — An instrument depending for its action on electrostatic forces and intended to indicate a potential difference or an electric charge.

4.21 Leaf Electroscope (with Leaves Made of Gold, Aluminium, etc) — An electroscope in which the detecting element is made of gold or aluminium leaf or foil.

4.22 Condenser Electroscope — An electroscope fitted with a condenser in order to increase its sensitivity.

4.23 Spark Gap — A device comprising two electrodes, the distance between which may be adjusted, separated by a liquid or gaseous dielectric and so arranged that a spark is produced between them when the potential difference reaches a certain value.

4.24 Synchroscope — An instrument used to indicate the synchronism of two ac voltages or voltage systems, showing also the order of magnitude of the difference between their frequencies when they are not equal and the order of magnitude of their phase difference when their frequencies are equal.

4.25 Phase-Sequence Indicator — An instrument with which the phase sequence may be determined at the point where it has been connected in a polyphase circuit or system.

4.26 Polarity Indicator — An instrument designed to indicate the polarity of one conductor with reference to another.

4.27 Insulation Indicator — Apparatus used to detect faults in electrical insulation.

4.28 Magnetic Indicator for Lightning Currents (Magnetic Link) — Magnetic indicator consisting of a bundle of fine wires or sheets of special steel and indicating by changes in its magnetic characteristics the approximate strength of current due to a nearby lightning stroke.

4.29 Voltage Detector (Voltage Indicator) — An instrument used to find out whether a conductor is live.

4.30 Magnetic Balance — A magnetometer the moving element of which rotates round an horizontal axis.

4.31 Galvanometer — An instrument intended for measuring or detecting currents that are usually very small.

4.32 Tangent Galvanometer — A galvanometer with a moving magnet, so arranged that the tangent of the angle of deflection is proportional to the current to be measured.

4.33 Sine Galvanometer — A galvanometer with a moving magnet, so arranged that the sine of the angle of deflection is proportional to the current to be measured.

4.34 Moving-Magnet Galvanometer — A galvanometer in which the fixed part comprises one or more coils carrying current and the moving element one or more magnets.

4.35 Moving-Coil Galvanometer — A galvanometer in which the moving element comprising a coil moves in a constant magnetic field when a current flows through it.

4.36 Differential Galvanometer — A galvanometer designed to measure the difference of two currents.

4.37 Ballistic Galvanometer — A galvanometer designed to measure a quantity of electricity by reading the amplitude of the first swing.

4.38 String Galvanometer — A galvanometer in which the moving element is a string or thread stretched between the pole pieces of a magnet or an electromagnet.

4.39 Vibration Galvanometer — A galvanometer in which the natural period of vibration of the moving element may be adjusted so that it is equal to that of the current which is being measured or indicated.

4.40 Thermo-Galvanometer — An instrument in which heat produced by the current being measured acts on a thermocouple, producing a secondary current which is measured by a sensitive galvanometer. It is also called 'thermocouple galvanometer'.

4.41 Shielded Galvanometer — A galvanometer provided with a magnetic screen which protects it from the action of external magnetic fields.

4.42 Electrodynamic (Kelvin) Balance — An electrodynamicometer in which electrodynamic forces are balanced by weight.

4.43 Ammeter (Milliammeter) (Microammeter) — An instrument for measuring current, directly or indirectly, in amperes (milliamperes) (microamperes).

4.44 Voltmeter (Millivoltmeter) (Microvoltmeter) — An instrument for measuring voltage directly or indirectly, in volts (millivolts) (microvolts).

4.45 Peak Voltmeter — A voltmeter which measures the maximum value of an alternating voltage.

4.46 Electrometer — An instrument used to measure potential difference by electrostatic means.

4.47 Quadrant Electrometer — An electrometer in which a needle or a flat moving element is deflected between fixed elements shaped like quadrants.

4.48 Multiple Electrometer — An electrometer in which several pairs of quadrants actuate several needles fixed to the same axis.

4.49 Vibrating Reed Electrometer — An instrument taking negligible current for measuring unidirectional voltage which is converted into alternating voltage by means of a vibrating capacitor and subsequently amplified.

4.50 Capillary Electrometer — An instrument for measuring small differences in potential by making use of capillary action.

4.51 Measuring Spark-Gap — A spark-gap, usually a sphere-gap, so arranged that it may be used for measuring peak voltages from the distance a spark jumps between its two electrodes.

4.52 Wattmeter (Kilowattmeter) (Megawattmeter) — An instrument for measuring, directly or indirectly, electric power in watts (kilowatts) (megawatts).

4.53 Varmeter (Kilovarmeter) (Megavarmeter) — An instrument for measuring, directly or indirectly, reactive power in vars (kilovars) (megavars).

4.54 Volt-Ampere Meter (Kilovolt-Ampere Meter) (Megavolt-Ampere Meter) — An instrument for measuring, directly or indirectly, apparent power in volt-amperes.

4.55 Teleammeter (Televoltmeter) (Telewattmeter) — An instrument with which it is possible to measure current (voltage) (power) in a circuit from a distance.

4.56 Ohmmeter (Megohmmeter) — An instrument for measuring, directly or indirectly, electrical resistance in ohms (megohms).

4.57 Earth Resistance Meter — An instrument used for measuring earth resistances.

4.58 Frequency Meter — An instrument for measuring the frequency of an alternating current.

4.59 Phase Meter — An instrument for measuring the difference of phase between two alternating electric quantities of the same frequency.

4.60 Power Factor Meter — An instrument measuring the ratio of active to apparent power.

4.61 Flux Meter — An instrument for measuring variations in magnetic flux and consisting of a moving-coil galvanometer, in which the controlling torque is negligible and the damping torque very large.

4.62 Magnetometer — An instrument intended to measure a magnetic field or a magnetic moment by its action on a magnetized needle.

4.63 Permeameter — An instrument for determining the magnetic characteristics of ferromagnetic substances.

4.64 Hysteresis Meter — An instrument designed for measuring hysteresis torque.

4.65 Electric Thermometer — An instrument for electrically measuring temperatures composed of a probe and an electric instrument.

4.66 Thermocouple Thermometer — An electric thermometer which uses a sensing element as thermocouple to which heat is transmitted directly.

4.67 Resistance Thermometer — An electric thermometer which uses a sensing element as resistance to which heat is transmitted directly, mainly by conduction.

4.68 Total Radiation Pyrometer — A pyrometer using an optical device to concentrate on a thermocouple the radiation from a specified area of the heat source of which the temperature is to be measured.

4.69 Disappearing Filament Pyrometer — A pyrometer in which the temperature of a heat source is measured by equalizing the brightness of an incandescent lamp filament with that of the image of the heat source focussed to coincide with the filament.

4.70 Electrical Torquemeter — An electrically measuring instrument for measuring torque.

4.71 Ratio Meter — An instrument for measuring the ratio of two electrical quantities.

4.72 Inductance Meter — An instrument for measuring inductance in henrys, millihenrys, etc.

4.73 Capacitance Meter — An instrument for measuring capacitance in farads, microfarads, etc.

4.74 Ondograph — An instrument used to record the wave shape of voltage or current by means of the periodic charge and discharge of a capacitor.

4.75 Oscillograph (Oscilloscope) — An instrument intended to record or indicate as a function of another quantity, generally time, the instantaneous values of a quantity, for example, current, voltage, etc (*see also 3.8*).

4.76 Oscillograph with Bifilar Suspension — An oscillograph having a moving element constructed on the same principle as a moving-coil galvanometer and consisting of two parallel strips.

4.77 Soft Iron Oscillograph — An oscillograph making use of the action of a coil on a strip of soft iron controlled by a permanent field.

4.78 Hysteresiscope — An instrument which traces hysteresis curves.

4.79 Klydonograph — An instrument in which a brush discharge is recorded on a photographic film for the purpose of detecting overvoltages and obtaining information concerning their nature, direction and order of magnitude.

4.80 Amplifying Vibrograph — A vibrograph which records curves of greater amplitude than the actual vibrations and with a specified ratio to them.

4.81 Recording Watt and Varmeter — A recording instrument which inscribes on the same diagram active and reactive powers in a circuit.

4.82 Voltameter (Coulometer) — An instrument used to measure the quantity of electricity by the quantity of material released electrochemically at an electrode.

4.83 Weight Voltameter — A voltameter in which the quantity of electricity is determined by the weight of metal deposited.

4.84 Volume Voltameter — A voltameter in which the quantity of electricity is determined by the volume of gas evolved.

4.85 Electrolytic Meter — A meter which registers the quantity of electricity by electrolytic means.

4.86 Ampere-hour (Quantity) Meter — An integrating instrument which measures the quantity of electricity in ampere-hours.

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4.87 Watthour (Active-Energy) Meter — An integrating instrument which measures the electrical energy in watthours.

4.88 Varhour (Reactive Consumption) Meter — An integrating instrument which measures the reactive energy in varhours.

4.89 Volt-Ampere-Hour (Apparent Energy) Meter — An integrating instrument which measures apparent energy in volt-ampere-hours.

4.90 Motor Meter — An integrating meter embodying some form of motor.

4.91 Commutator Motor Meter — A meter in which a magnet actuates a moving element provided with a commutator.

4.92 Thomson Meter — A meter in which driving torque is produced by the action of a series coil on a moving armature provided with a commutator and connected in shunt to the supply.

4.93 Induction-Type Meter — A meter in which fixed coils carrying currents act upon a conducting moving element, generally a disc, in which flow currents are induced by the coils.

4.94 Oscillating Meter — A meter which registers the oscillation of a moving coil subjected to the action of a fixed coil.

4.95 Pendulum Meter — An oscillating meter in which a coil or a moving magnet is attached to a pendulum.

4.96 Excess Meter — A meter which registers the excess energy (quantity of electricity) consumed in a circuit only when the power (current) exceeds a certain value.

4.97 Excess and Total Meter — A meter which registers the excess energy (quantity of electricity) consumed in a circuit only when the power (current) exceeds a certain value and also the total energy (quantity of electricity) consumed in a circuit.

4.98 Meter with Demand Indicator (Maximum Demand Indicator) — A meter carrying a pointer which indicates the highest value of the average power or current utilized during successive equal intervals of time.

4.99 Meter with Maximum Demand Recorder — A meter fitted with a recording arrangement which records the mean values of the power or current utilized during successive equal intervals of time.

4.100 Summation Meter — A meter used to register the total energy consumed in two or more separate circuits.

4.101 Hour Meter — An instrument designed to measure the time during which electrical energy has been used.

4.102 Multi-rate Meter — A meter provided with a number of registers, each becoming operative at times corresponding to different rates of charge.

4.103 Prepayment (Slot) Meter — A meter which is a combination of an electricity meter and a coin-feed mechanism which interrupts the consumers' supply after a measured time or after delivery of an appropriate amount of electrical energy.

4.104 Transformer Loss Meter — A meter installed on the load side of a power transformer designed to measure the iron or copper-losses or both in that transformer.

4.105 Meter-Relay — A relay comprising the elements of a meter, except that the registering device is replaced by contacts or by a device which produces a controlling torque.

4.106 Impulse Meter — An instrument which registers the number of current impulses passing through a circuit.

4.107 Impulse Recorder — A recording instrument which traces a curve the ordinates of which are proportional to the number of current impulses passing through a circuit during equal time intervals.

4.108 Restricted Hour Maximum Demand Indicator — A maximum demand indicator, so arranged that it operates during certain hours of the day only.

4.109 Electromechanic Counter — Mechanically working clock type dial relay used to count electrical pulses, possibly combined with electronic accessories.

4.110 Tolerance Meter — Apparatus used to measure electrical parameters, which generally directly indicates in percents the difference between the measured parameter and built-in or connected to standards.

4.111 Impedance Meter — Measuring apparatus used to measure complex resistances calibrated in resultant values of real and imaginary components.

5. ELECTRICAL COMPENSATORS, MEASURING BRIDGES AND MEASURING DEVICES

5.1 Electrical Measuring Device — An assembly of components (for example, resistors, inductors, capacitors, together with measuring apparatus) by means of which electrical or magnetic measurements may be made.

5.2 Resistor — An assembly of conductors which is used specially because of its resistance.

5.3 Resistance (Capacitance) (Inductance) Box — An assembly of electrical resistors (capacitors) (inductors) of known nominal values mounted in a box.

5.4 Adjustable Resistance (Capacitance) (Inductance) Box with Plugs — A box containing an assembly of electrical resistors (capacitors) (inductors) of known values connected or disconnected by means of plugs and sockets.

5.5 Adjustable Resistance (Capacitance) (Inductance) Box with Switches — A box containing an assembly of electrical resistors (capacitors) (inductors) of known nominal values connected or disconnected by means of a switch.

5.6 Decade Resistance (Capacitance) (Inductance) Box — A box in which the resistors (capacitors) (inductors) of known nominal values are divided into groups called decades; in each decade the value of the resistance (capacitance) (inductance) is multiples or submultiples of 10 of the corresponding value in the adjoining decades. The quantity is varied by means of elements (brushes or plugs) with which it is possible to regulate, in each decade, the grouping of components into circuits.

5.7 Decade Resistance (Capacitance) (Inductance) — A resistor (capacitor) (inductor) group of known nominal value varied in steps by plugs or switches from zero to 9 or 10 units, the basic value of which is a round value.

5.8 Decade Conductance Box — A box in which conductances of known nominal values are divided into groups called decades; in each decade the values of the conductances are multiples or submultiples of 10 of the corresponding values in the adjoining decades.

5.9 Double Resistance Box — A box holding two identical sets of resistors of known nominal values arranged in such a way that it is possible to introduce simultaneously, in the same circuit or in two different circuits, two resistors of equal value.

5.10 Twin Resistance Box — A box containing two identical sets of resistors of known nominal value, so arranged that the sum of the resistances in the two groups introduced into appropriate circuits remains constant.

5.11 Bridge — A measuring device consisting of at least four arms of groups of circuit elements (resistors, inductors, capacitors, etc), so connected as to form a quadripole allowing the connection of a current source and of a measuring instrument.

5.12 Slide-Wire Bridge — A bridge in which one or two arms is (are) formed by a scaled wire along which a sliding contact may be continuously moved.

5.13 Post Office Box — An assembly of calibrated resistors mounted together in a box and forming three arms of Wheatstone bridge.

5.14 Wheatstone Bridge — A bridge with four arms in which the arms consist of resistors.

5.15 Double (Kelvin) Bridge — A measuring device intended to compare two resistors connected in series in a main circuit and comprising two arms, each of which consists of two adjustable resistors connected in series, one of them being connected across the neighbouring terminals and the other across the remote terminals of the resistors to be compared; the balance detecting instrument being connected across the points common to the two resistors of each arm.

5.16 Impedance Bridge — A device in which a bridge arrangement is used to measure impedances.

5.17 Schering Bridge — A device designed for measuring capacitances and the loss angle of insulating materials, and comprising capacitors and resistors in bridge connection.

5.18 Distortion Bridge — A device in which a bridge arrangement is used to determine the degree of distortion of a wave.

5.19 Potentiometer — A measuring device composed of calibrated resistors, of which one may be a calibrated wire, and used to compare an unknown potential difference by a null method. It may be so arranged and marked that it is possible to read directly the value of the potential difference to be measured or a decimal multiple of it.

5.20 Deflection Potentiometer — A potentiometer in which the null device is replaced by a measuring instrument on which may be read the last figures of the value of the potential difference which is to be measured.

5.21 Slide-Wire Potentiometer — A potentiometer comprising calibrated resistors and a calibrated wire.

5.22 Drum Potentiometer — A potentiometer comprising calibrated resistors and a calibrated wire wound on a drum.

5.23 Test Desk — An assembly of apparatus in the general form of a table or desk and comprising measuring instruments, devices for regulation of voltage, current and phase displacement, and other accessories required for convenient calibration of meters and instruments, or of instrument transformers.

5.24 Electrical Telemetry Device — An electrically operated device, suitable for indicating or recording remotely the measured value.

5.25 Measuring Equipment — A box containing all instruments and accessories necessary to a given measuring process, the necessary connections being pre-established.

6. ELECTRICALLY MEASURING INSTRUMENTS

6.1 Cable Fault Locator — A measuring device to determine the distance between the site of fault occurring on a cable and the site of measuring.

6.2 Compass Magnetic — An instrument in which the moving element consists of a magnet moving about an axis which is actuated by a magnetic field independent of the apparatus.

6.3 Dip Needle — A compass in which the magnet may move only in a vertical plane and which measures the magnetic inclination.

6.4 Declinometer — A compass in which the magnet may move only in a horizontal plane and which measures the magnetic declination.

6.5 Electrical Tachometer — An electrically measuring instrument for measuring the speed of rotation of a rotating body.

6.6 Electrical Revolution Counter — An electrically measuring instrument used to count the number of revolutions made by a rotating body.

6.7 Electrical Seconds Counter — An electrically measuring instrument used to measure short periods of time in seconds and minutes.

6.8 Synchronous Timer — A seconds-counter driven by a synchronous motor.

6.9 Electrical Extensometer — An electrically measuring instrument for measuring variation in the dimensions of a solid.

6.10 Electrical Tachograph — An electrically measuring instrument intended to record a speed as a function of time.

6.11 Liquid Level Indicator — An electrically measuring instrument for measuring the level of a liquid.

6.12 Liquid Level Recorder — An electrically measuring recording instrument which measures the level of a liquid.

7. ACCESSORIES

7.1 Thermocouple (General Definition) — A pair of conductors of dissimilar materials joined at one end and intended to form part of an arrangement using the thermo-electric effect.

7.2 Thermal Converter (Electrically Heated Thermocouple) — A device comprising a thermocouple and a conductor which is heated by the current to be measured.

7.3 Thermopile — An arrangement comprising several thermocouples connected in series.

7.4 Thermometer Resistor — A sensing element used to measure temperatures, the variation of the resistance of which is known as a function of temperature.

7.5 Pyrometer (Thermometer) Probe — A sensing element of an electrically measuring thermometer (thermocouple or thermometer resistor) mounted on the required spot according to the needs of the measurement.

7.6 Pyrometer (Thermometer) Tube — A thermocouple or thermometer resistor fitted into a protective tube.

7.7 Bolometer — An instrument designed to measure temperature variation by the change in a metallic resistance comprising one of the arms of a Wheatstone bridge.

7.8 Hall Generator — A semiconductor used to perceive magnetic fields, the voltage between two appropriate points of which is a known function of the product of the magnetic field strength by the current passing in the semiconductor.

7.9 Bismuth Spiral — A sensing element which uses the variation of the electrical resistivity of bismuth with the strength of a magnetic field and is designed to measure fields strength.

7.10 Electrical Measuring Counter — A device producing another measurable, physical quantity proportional to the input in which at least one of the involved physical quantities is electrical.

7.11 Voltage Divider — A device comprising resistors, capacitors or inductors by means of which it is possible to obtain between two points a voltage proportional to the voltage to be measured.

7.12 Delay Cable (Delay Line) — A length of cable or equivalent used to delay the arrival of a transient phenomenon at a measuring instrument, generally an oscillograph.

7.13 Demand Attachment (for a Meter) — An attachment for a meter which indicates the highest value of the average power or current utilized during successive equal intervals of time.

7.14 Maximum Recording Attachment — A device designed for attachment to a meter and which draws a curve the ordinates of which are proportional to the average power in a circuit during equal intervals of time.

7.15 Meter Chageover Clock — A clock which changes at predetermined times the interconnection between the moving element of a meter and the counting mechanism corresponding, for example, to different tariffs.

7.16 Test Terminal Box — A special terminal box which is placed beside a meter to facilitate the calibration of the latter without disturbing the

operation of the installation in which it is included and for easy connection of test instruments.

7.17 Time Switch — A device which closes or opens at predetermined times one or more electrical contacts.

7.18 Standard Cell — A primary cell giving, with great constancy, an exactly determined dc voltage. Its best known form is the internationally used Weston cell.

7.19 Standard Resistance — A metal or metal-alloy resistor of high constancy incorporating the unity of electric resistance (ohm) or a value in an exactly determined ratio to it.

7.20 Instrument Leads — Conductors specially designed for connecting a measuring instrument and its accessories.

8. CONSTRUCTIONAL ELEMENTS

8.1 Moving Element — The moving part of an instrument the deflection of which is observed.

8.2 Astatic Element — An element so constructed that it is unaffected by symmetrical magnetic fields.

8.3 Terminal — That portion of a circuit or piece of apparatus which is intended for the reception of conductors by means of which it may be connected electrically to another circuit or piece of apparatus.

8.4 Spot — Image projected on to a scale to act as an index.

8.5 Pointer — An index attached to the moving part of an instrument so that its deflection may be observed.

8.6 Dial — A surface which carries the scale and numbers.

8.7 Measuring Element — The active part of a measuring instrument which includes all parts the interaction between which actuates the moving element.

8.8 Control Magnet — A magnet designed for adjusting the direction of the system of moving magnets in some galvanometers.

8.9 Braking Magnet (of a Meter) — A magnet which acts on the disc and produces the braking torque.

8.10 Damping Magnet (of a Measuring Instrument) — A magnet which by acting on a suitable moving part, produces damping torque in the instrument.

8.11 Compensating Magnet — A magnet used with certain galvanometers, in order partially to compensate for the effect of the earth's field or of an external magnetic field. It sometimes also serves as a control magnet.

8.12 Quadrants — Metal sectors (generally in the form of quarters of a circle) forming part of certain measuring instruments.

8.13 Suspension — A means of suspending the moving element of an instrument (extended to include the supports carrying it).

8.14 Bifilar Suspension — A means of suspending a body on two threads, wires or strips, generally used to produce or measure a torque.

8.15 Shunt — A resistor connected parallel with an instrument in order to reduce the current which passes through it. The resistance value may be so chosen that the reduction is in a known ratio.

8.16 Universal Shunt — A multiple shunt composed of a number of resistors connected in series in such a way that all its ranges have a common connection. This shunt has the property that the ratio of the multiplying powers of any two ranges is independent of the resistance of the instrument to which the shunt is connected.

8.17 Resonant Shunt — A shunt comprising an inductance and a capacitance in resonance for a given frequency.

8.18 Magnetic Shunt — A piece of iron designed to carry part of the flux of a magnet or electromagnet in a measuring instrument in order to control its action.

8.19 Series Resistor (Capacitor) (Reactor) — A resistor (capacitor) (reactor) connected in series with a voltmeter or the voltage circuit of a measuring instrument, especially to alter its voltage range.

8.20 Pivot — The end of the spindle of a moving element which rests on a jewel or other hard substance.

8.21 Meter Bottom Bearing — The support upon which the moving element of a meter rests.

8.22 Jewel Bearing — A part with a small jewel at the end, designed as a support for the pivot of a moving element.

8.23 Stop — A part which limits the deflection of the moving element of a measuring instrument.

8.24 Terminal Box (Terminal Plate) — A support made of insulating material on which all the terminals of an instrument or a part of them are grouped together.

8.25 Magnetic Screen (Magnetic Shield) — A screen or shield of ferromagnetic material designed to protect the operating part of a measuring instrument from the effects of external magnetic fields.

8.26 Electromagnetic Screen — A conducting shield designed to protect the operating part of a measuring instrument against external alternating fields.

8.27 Electrostatic Screen (Faraday Cage) — An enclosure, composed of a metal sheet or wire netting with a fine mesh, intended to protect an enclosed space from the effects of external electric fields.

8.28 Meter Base — The back of the meter by which it is fixed and to which are attached the frame, the terminal plate and the cover.

8.29 Meter Frame (Meter Support) — That part to which are affixed the moving element, the counting mechanism and generally the brake magnet, sometimes the regulating devices.

8.30 Meter Cover — The enclosure on the front of the meter, including transparent parts through which the movement of the disc may be seen and the counting mechanism read.

8.31 Meter Case — The assembly of the base and the cover of a meter.

8.32 Register (Counting Mechanism) of a Meter — That part of the meter which registers the energy, or more generally the value, of the quantity measured by the meter.

8.33 Driving Element of an Induction Meter — One of the working parts of the meter which produces a torque by its action on the moving element. It generally comprises an electromagnet with its control devices.

8.34 Meter Braking Element — That part of the meter which is intended to produce a braking torque by its action on the moving element. It comprises one or two magnets and their adjusting device.

8.35 Meter Terminal Cover — That part of the cover, or auxiliary cover, which covers the terminals, the ends of the wires or cables from the apparatus connected to the meter.

8.36 Stroboscopic Meter Disc — A disc having marks at equal distances on its periphery edge so that its movement may be observed stroboscopically.

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